THE

GEORGE WASHINGTON UNIVERSITY

NAVY GRADUATE COMPTROLLERSHIP PROGRAM

BUDGETING IN THE OVERHAUL AND REPAIR DEPARTMENTS

By

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For

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PREFACE

I have always felt that there existed a serious need for some publication which could be used as a quick reference by all concerned, one which would offer assistance in a clear and concise manner, and above all, be written in the layman's language as to just what was expected of the Overhaul and Repair Department at an air station. I also believed such a presentation should be so designed as to enlighten readers, be easy to read, and provide sufficient interest to remain out of all special hiding places.

Therefore, this paper has been prepared with such thoughts in mind. Much research and investigation has taken place to provide authentic information. It is my hope that this material may prove useful and be of some assistance to one who might be interested.

I sincerely appreciate and acknowledge the advice and assistance extended by numerous members of the Bureau of Aeronautics.

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CHAPTER I

INTRODUCTION

The Integrated Aeronautic Program (IAP) is the name applied to both (a) the management system under which policies, plans and programs covering the logistic support necessary to the accomplishment of naval aviation's operation mission, are established, disseminated, implemented, and reviewed and controlled, and (b) the individual programs established under this system. This program, though capable of expansion to cover all phases of the aviation program, is at the present time limited chiefly to those phases involving the determination of over-all requirements for aircraft, their allocation, distribution and maintenance, and to the provision of adequate aviation supply therefor. In only a very minor way is it concerned with other phases of the aviation program such as aviation establishments and certain types of personnel of aviation activities. Many subjects which are highly significant to naval aviation are excluded from this program either wholly or in part, such as: production of aircraft and materials, aviation research and development, the guided missiles program, mobilization requirements planning, and aviation personnel. Furthermore, this program does not include those functions by which the operational mission of naval aviation is formulated.

Under the Integrated Aeronautic Program management system, several individual programs have been established, one of which

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INTRODUCTION

has as its objective "to furnish in adequate numbers to all Navy and Marine Corps aeronautical activities the most modern, most efficient kinds of aircraft." To accomplish this objective, policies have been established for determining total requirements for aircraft, for assignment, allocation and distribution of these aircraft, and for their removal from the inventory when they no longer are part of the "most modern, most efficient" category.

One of the most far reaching policies so established is that an aircraft shall follow a prescribed pattern, or standard service life, from the time it is accepted by the Navy until it is retired from the Navy inventory. (This policy is applicable to all Navy and Marine Corps aircraft except experimental aircraft, target drones, guided missiles and any other aircraft defined by the Navy as "non-program" aircraft.) The total service life for any given model aircraft is determined by applying certain planning factors. These factors include (1) length of service tour; that is, how many months an aircraft shall remain in an operating unit before it is replaced (2) number of service tours; that is, how many service tours an aircraft shall serve (3) length of time in rework; that is, the length of time it takes for an aircraft to be moved to and from the operating command, the time it must await overhaul and the time spent in actual overhaul. Furthermore, inasmuch as some aircraft will be lost before completing their planned life span, there is also a planning factor which has to do with predicted attrition rates; that is, the expected losses.

This paper will not deal with aircraft which undergo the "heavy maintenance program" which is generally accomplished by contract with private aircraft manufacturers. Aircraft that receive this type of maintenance generally are the four-engine transports and are considered non-tactical.

For aircraft which follow the so called "normal" standard service life, the following pattern applies:

1. Accepted by Bureau of Aeronautics from the company which built it, is modified if necessary, and made ready for delivery to an operating command.
2. Delivered to an operating command for its "first service tour." The length of this tour is described in the planning factors in number of operating months.
3. Returned to Bureau of Aeronautics (Overhaul and Repair Department) for rework or "First overhaul."
4. Delivered to operating command for "second service tour."
5. Returned to Bureau of Aeronautics (Overhaul and Repair) for rework or "Second overhaul."

This cycle of service tours and rework continues for as many tours as have been approved in the planning factors, unless the aircraft is lost from the inventory before that time for some reason.[1]

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[1]OPNAVINST 4000.16

This paper will deal entirely with the Overhaul and Repair Department which supports the Integrated Aeronautic Program of the Navy by:

1. The overhaul, modification and repair of aircraft, guided missiles, target drones, engines, accessories and components, including disassembly, cleaning, examination, repair, modernization, test, inspection, assembly, preservation and packaging.
2. The manufacture of aircraft parts and assemblies required in the support of the foregoing program.
3. The maintenance of and, to a limited extent, the manufacture of the tools and equipment used in the performance of the foregoing work.

CHAPTER II

DEVELOPING THE WORKLOAD OF THE OVERHAUL AND REPAIR DEPARTMENTS

The Overhaul and Repair Departments of the Bureau of Aeronautics workload requirements are developed by applying planning factors to the operating aircraft requirements set by higher authority in the Navy, the Department of Defense, Congress and the President. If naval aircraft are being used operationally to a maximum, the Overhaul and Repair Departments will be operating at their maximum, or if the aircraft are being used at a minimum operationally the Overhaul and Repair Departments workload will be at a minimum. Aircraft are overhauled, maintained and modified to meet the qualitative and quantitative requirements of the naval aircraft program.

The Bureau of Aeronautics, as the management authority, is responsible for the scheduling of Navy aircraft, including engines and other aeronautical parts for overhaul. Overhaul is specialized to permit use of assembly line methods and techniques; where feasible, taking into consideration operating requirements, geographic location and lines of supply and transportation. Overhaul points are specialized according to types and models. In some instances it is considered advisable to have two overhaul points for one particular type of aircraft or engine which is used by the fleet on both coasts, particularly carrier types. The

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problem of moving aircraft and engines from one coast to another must be considered. The mobilization program, as well as vital defense, must be protected against the jeopardy involved in placing overhaul of combat models on one coast only.

The Bureau of Aeronautics has a uniform organization at the Overhaul and Repair Establishments and controls these departments by setting policies and procedures, as well as standards, from the maintenance division headquarters. Probably the greatest aid in the control of the expenditure of funds and man-hours allocated to the overhaul, modification, and repair of aircraft and engines, and to related programs is the Aeronautics Overhaul and Repair Cost Accounting Handbook. This publication was developed by the Comptroller of the Navy and explains the way to develop norms, in terms of man-hours and costs, for the accomplishment of the various work programs of Overhaul and Repair Departments in order to make possible more nearly accurate allocation of funds, control of expenditures, determination of personnel requirements, and workload distribution. Through this publication, performance is evaluated at shop, branch, and division levels throughout the entire system and aids in determining, from the cost standpoint, the advisability of overhauling aircraft versus procurement of new aircraft. Budget estimates may be prepared which correctly recognize the requirements of the Navy Department and the naval service.

CHAPTER III

BUREAU CONTROL

The Bureau of Aeronautics Maintenance Division uses a central organization to schedule and control the many Overhaul and Repair Departments' workloads. Schedules for the overhaul and modernization of aircraft are published in sufficient time to allow time for adequate planning by recipients (Aviation Supply Office and the Overhaul and Repair Departments concerned). Quarterly letters are sent to the Aviation Supply Office and the Overhaul and Repair Departments, which enclose overhaul and modernization schedules projected for five fiscal-year quarters -- the first quarter being a firm schedule and the remaining four quarters being planning schedules.

The Bureau of Aeronautics maintains financial control over the Overhaul and Repair Departments by the granting of allotments which are identified with specific programs. These programs usually conform to the same pattern from year to year, thus providing continuity and consistency in operations from year to year.

Although it is planned in the near future, no budgetary or financial control is presently exercised over the use of technical material drawn from inventories. This material (called Appropiation Purchases Account material, APA) is issued from stores without charges to allotments, except when the material of one bureau (APA stocks are identified to owning bureau) is used for the

purpose of another bureau. In those cases, the applicable allotments are charged at standard inventory prices for the material used, procedurally being handled generally in the same manner as material purchased locally from commercial concerns.

The most effective control that the Bureau of Aeronautics has over the Overhaul and Repair Departments, for budgetary and financial control, is the reporting system. Listed below are the reports required from Overhaul and Repair Departments in their relative importance:

Industrial Cost Report (Aer-Rep-FI-7)

This report presents cost and related statistical data applicable to the aircraft overhaul program. It presents man-hours, both military and civilian, associated labor dollars, NSA, APA and locally procured material costs including overhead of products produced, such as overhauled aircraft, engines and spare parts. This data is used by the bureau program managers in production of workload scheduling, fund administration and budgeting control at bureau level. This report is broken down into three separate sections which are explained below:

Section A - Total Man-Hours and Cost (NAVAER Form 2511A) -- Section A presents a summary report of all man-hours expended and costs incurred by, or directly for, the Overhaul and Repair Department during a calendar month, indicating the general purpose for which the costs were incurred. Military labor, civilian labor,

Navy Stock Account material, locally purchased material, and Appropriation Purchases Account material, both direct and indirect are included.

Section B - Unit Man-Hours and Costs (NAVAER Form 2511B) -- This report presents monthly average unit man-hours and costs of aircraft overhaul, heavy maintenance, modernization, conversion and engine overhaul, and quarterly average unit costs of processing listed class 265 material. Aircraft and engine unit costs are reported on job orders closed during the month, and hence the number of units physically completed during the month. Applied overhaul and repair, indirect cost and station overhead are included in aircraft and engine unit costs. The quarterly average unit costs for listed class 265 material are based upon physical completions during the quarter, and the number of units listed must agree with the number of completions as listed in the Industrial Status Report. Indirect and overhead costs are not applied to costs of processing class 265 material; direct unit man-hours and direct costs only are shown in this report.

Section C - Station Overhead and General Statistics (NAVAER Form 2511C) -- Section C shows the monthly station overhead computation and presents statistical data relating to employment, pay-rates, man-hours, overhead and leave.

Overhaul and Repair Department Estimated Projects (NAVAER Form 2520)

Two separate NAVAER Forms 2520 are submitted annually; one

for the oncoming fiscal year (Funding 2520) and one for the subsequent fiscal year (Budgetary 2520). Funding 2520 includes all known requirements for the oncoming year for which funds are required and which have not been previously allocated. Budgetary 2520 includes all planned requirements for the subsequent year and is based upon the best information available and the assumption that items in Funding 2520 will be approved and financed.

Planned Improvement in Industrial Cost Reports for Aircraft Overhaul Functions

Current information being received in the reporting system is considered superfluous and plans are under way to try and get more information on overhead and eliminate some of the details of direct labor. Thought is being given to institute a study to financing all of the overhaul activities by the Industrial Fund system. The Wolf Management Engineering Company is under contract to review present cost control practices in the Overhaul and Repair Departments to develop improvements. The planned cost control systems to come out of this study contemplates coordination of engineered performance standards and mechanized production control, with the cost accounting system presently in use. The expected results of the cost control system are:

1. Improved local control of costs.
2. Improved comparison of performance between Overhaul and Repair Departments.

3. Improved local budgeting of funds.
4. Improved comparison of the cost of Overhaul and Repair Department functions with those of private industry.
5. Development of a more cost conscious attitude at a local level, and at the same time, dispel an alleged attitude that all funds made available must be spent.

It is believed that the Bureau of Aeronautics reporting system is bringing together into a single relationship manpower input and product output to a point where standards can be set for the end product -- that is, where variables do not have to be measured. (This covers overhaul of crashed aircraft or those aircraft that are in for their third or fourth overhauls.)

On 1 September 1954 the Bureau of Aeronautics established a uniform organization for all of its Overhaul and Repair Departments. The organization that was set forth was to establish uniformity so that better centralized control could be maintained within the bureau. The organization was based on a modern concept of industrial engineering, production planning and control and cost control.

This paper will be chiefly concerned with the Cost Control Officer and the Production Manager, who are responsible for cost control and budgeting, and their functional responsibilities

which were established in the new organization of the Overhaul and Repair Departments. Listed below are the functional responsibilities of the Cost Control Officer:

1. He is responsible to the Overhaul and Repair Officer for the expenditure of all funds assigned to the Overhaul and Repair Department, ensuring compliance with all statutory requirements relative to administration thereof. He keeps the Overhaul and Repair Officer informed on the status of costs, expenditures, allotments and charges.
2. He takes necessary action to maintain an effective cost control program.
3. He supervises the development of the master budget for the Overhaul and Repair Department based on the performance budget concept.
4. He conducts a review of requests for project orders and allotment "D" funds relative to adequacy of justification and consistency with over-all requirements and mission of the department.
5. He supervises the operation of an effective departmental cost accounting system, compatible with fiscal and cost accounting requirements of the Bureau of Aeronautics. He fosters the development and utilization of improved methods of financial and cost accounting on a continuing basis.

6. He conducts an analysis of department plans for the purpose of determining their effect on performance budgets for department activities and required department funds.
7. He reviews departmental personnel ceilings and overtime, and extra shift limitations when necessary, to prevent over-expenditure of funds and assure economy of operations.
8. He acts as a consultant and advisor to the Overhaul and Repair Officer and to the assistant officer for the purpose of fostering effective over-all organization and procedures in the department.
9. He determines and formulates plans for organization studies in the department to evaluate the over-all organization structure and appraise individual organization proposals. He follows up recommendations approved by the Overhaul and Repair Officer to see that they are carried out effectively.[2]

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[2]Bureau of Aeronautics Instruction 5451.12

CHAPTER IV

MANAGEMENT OF THE OVERHAUL AND REPAIR DEPARTMENTS

In this chapter an attempt will be made to give ways and means of getting maximum production from the Overhaul and Repair Departments by use of some of the controls of local management within these departments. Plant equipment and plant improvements will not be discussed as these items are considered to be under direct bureau control. Prototype items will not be considered due to the many variables that enter into the initial planning phase.

Although it is possible to conceive and operate a sound system of budgetary control without standard costs, the problem of establishing budgets is greatly simplified if standards already exist. Actually there is no fundamental difference between a "budget" and a "standard". Both are based on the idea of predetermination; both operate on the exception principle. In this chapter, budget and standard will be synonymous in meaning.

Concealed in the attempt to relate costs to objectives, operations or decisions lie a number of real problems. Unfortunately, the real world is so full of problems that it is not uncommon to find them solved by expedient means, one of the simplest and most effective of which is to ignore the problems. Since capitalism is based on the profit motive, which involves risk, and within the Overhaul and Repair Departments we lack the profit motive, our problems become more involved than they would be if we were

operating a private corporation. In order to get maximum production from related programs within the Overhaul and Repair Departments, we have to turn to some type of work measurement system. Probably the two most well known measurement systems are the time in motion system, and the standards system in terms of man hours and costs. At the present time the latter system is being installed at the Overhaul and Repair Departments.

The general requirements of management and planning personnel within the Overhaul and Repair Departments are similar to those of the Bureau of Aeronautics. This paper will primarily be concerned with the functions of the cost control officer and the production manager in providing management with tools to effect more efficient operation.

Within the cost control office is the responsibility for the control of the department funds, the management of the cost control program, the development of the master budget, forms and reports control, and the coordination of new and improved management systems.

To clarify the above, the cost control officer is responsible for the following functions and responsibilities:

To review budget estimates prepared by respective organizational units covering their requirements for items such as direct labor, direct material, indirect material, services, plant improvement, modifications, capital equipment, and

miscellaneour equipage. Develop the master budget for the department. Submit budget requests for operating funds and administer funds received. Under the performance budget concept, issue budget control instructions to, and establish budgets of available funds for, the operating units. Suballot such funds as are required to conform properly to the purpose for which the funds were granted. Review and maintain records of expenditures and status of funds. Review internal financial records of transactions. Compile, prepare, analyze and present reports of internal fiscal matters required by higher authority. Provide assistance and advice to operating levels on budgeting, fiscal accounting, and on the scope and distinguishing characteristics of each budget, allotment, project order and other separate funds. Maintain departmental liason with the fiscal department. Authorize job orders which result in lodgement of expenditures against alloted funds. Recommend departmental personnel ceilings and overtime and extra shift limitations when necessary to assure solvency.

Maintain, analyze and summarieze cost reports, production reports and other performance records and data to evaluate performance, assay trends, localize areas of high cost and determine contributing causes. Recommend the direction and nature of corrective action and improvement indicated.

Develop and prepare comprehensive reports of analysis, statistics, graphs, charts, and other media to effectively inform management as to performance and performance trends. Establish and maintain procedures necessary to control operational costs. This includes the issuance of instructions and procedures on local applications of the cost control system, interpreting Bureau of Aeronautics policies and instructions, and collecting cost data. Ensure the correctness of timekeeping methods and procedures and assign job numbers in order to develop maximum accuracy of charges and costs. Conduct surveys, review proposed changes, and make recommendations for improvement of departmental organization, administrative policies, responsibilities and procedures. Study organization and rate structures in the department in light of Bureau of Aeronautics and other appropriate directives to ensure that functions and lines of authority are clearly defined, and that modifications are made to meet changing conditions. Coordinate development of new and improved management systems, control design and use of all forms and reports, and manage the forms and reports control programs.[3]

To aid the cost control officer as well as the supply officer, cost control centers are established within the Overhaul and Repair Departments. These centers are established in such number

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[3]Bureau of Aeronautics Instruction 5451.12

as are required to service efficiently the production shops, and are located as close as possible to the shop which they service in order to effect necessary coordination. Theoretically, for practical purposes, there should be a cost center for each independent production department. The primary purpose of the control centers are listed below:

1. To maintain a receiving area, and receive and store incoming work and release completed work for the shop(s) serviced.
2. To assign work to the shop(s) in accordance with schedule sheets, route sheets, work orders, or other scheduling devices.
3. To identify parts received and prepare shop orders including supplemental routing as required.
4. To maintain and operate shop control boards in accordance with the prescribed mechanized production planning and control system.
5. To maintain shop production records and keep the shop supervisor informed of current and anticipated workload status.
6. To initiate timely requests for, and obtain required aeronautical parts and materials from shop stores, to initiate follow-up action on materials not available in shop stores, and initiate disposal action on material in excess of the shop(s) need.

7. To obtain existing tooling, jigs and fixtures for the work assigned.
8. Initiate action to alleviate parts delays and material shortages.
9. To operate finished parts storerooms to receive completed work from other control centers, to collect materials for sub-assembly and assembly, to prepare shop orders for material received requiring further work, and to expedite overdue material.

The production manager of the Overhaul and Repair Departments has the functional responsibility of coordinating and directing the efforts of the shops, production planning, and the production engineering groups in the proper accomplishment of the assigned workload. He exercises direct control over and ensures coordination between these three groups in the scheduling of workloads, the provisioning of equipment and materials, and the determining of methods and performance standards so as to produce work of satisfactory quality in the assigned time at a minimum cost. He must continually review and evaluate the over-all productive capabilities and operating costs in order to effectively meet changing times.

The shop's officer, who is responsible to the production manager, directs the activities of the shop's group. He establishes the degree of urgency of all production and ensures that work is

accomplished on schedule with efficient utilization of personnel. He maintains liaison with the production planning officer and the production engineering officer to ensure coordination of efforts is maintained in the respective groups. He is also responsible for compliance of his department with directives from higher authority.

The production engineering officer is responsible to the production manager for design and arrangement of equipment, design and applicability of tooling, the assignment of departmental space, the maintenance of operational sequences, work methods, and production standards. He also directs the activities of the methods and standards division in providing services to develop and maintain method analysis and time standards applications to all shop and office areas. Liaison is maintained with other station departments or outside activities when industrial studies encompass such activities.

The production planning officer is responsible to the production manager for scheduling the departmental workload, providing the required materials and dispatching and progressing the work in process. He also provides working liaison with outside activities concerning the induction of work or work in process within the department.

The diverse cost items in overhead and the divided responsibility open the road to many excessive costs within the Overhaul

and Repair Departments. Furthermore, the fact that many excessive cost elements have been overlooked in the past, encourages neglect of proper control. Increase of employees is often required when production is at a high level, and is very slow in being eliminated when production is at a low. These examples indicate sources of waste that must be eliminated to keep production within prescribed standards.

The basic approach to the control of overhead in the Overhaul and Repair Departments is fundamentally the same as that applied to direct costs, the setting of standards, the measurement of actual performance against these standards, and the taking of corrective action when those responsible for meeting standards repeatedly fail to reach the goal. This standard may change at different volume levels, or stated in other terms, it must have sufficient flexibility to adjust to the level of operations under which production is being maintained. To this extent the setting and application of overhead standards may differ from those used in the control of direct material and direct labor. It is believed the Aeronautics Overhaul and Cost Accounting Handbook has made every attempt to apply air and meaningful standards which should ease the work of the cost control officer in the formulation of the budget. It brings to his attention that it is not good to err in his thinking -- that little is needed or that nothing can be accomplished.

In formulating a budget and using the budget as an instrument of control, standards become an absolute necessity. Within the Overhaul and Repair Departments it seems that engineered performance standards normally are the best available and the most accurately derived. Standards that are developed by the departments that are based on historical data are important for comparison purposes. Regardless of which one or combination of standards is selected, standards must be used as the basis for the development of the budget, since the budget is the detailed translation of the operating plans into financial plans. In order to measure performance we must have a yardstick against which to measure it; this yardstick is the standard developed for the particular item in terms of standard hours and standard cost. When a deviation from standard is reported then a correction must be made. The reporting of performance by mere submission of figures to show expenditures against amounts budgeted is considered an incomplete job.

Some people consider the budget one of those quarterly or yearly evils inflicted by someone up the ladder, and therefore it should be run through as quickly as possible so that they can get back to other work. The facts must be faced -- the Overhaul and Repair Departments are under constant pressure by the Bureau of Aeronautics to put their operations on a business-like basis.

Budgeting is a continuous process because there are always changes in operating plans, and since the budget is the translation of an operating plan into a financial plan, it is necessary to review the budget periodically for the purpose of revising it to reflect the changes in planning. If we budget ahead we must plan ahead, and if we plan ahead we must make decisions in advance so we can give them full and unhurried consideration at a time when they won't be influenced by an atmosphere of pressure, crisis and deadline. One of the major problems of budgeting within the Overhaul and Repair Departments is the lack of advanced planning information.

The budget is a valuable tool for planning and controlling the programs of a department. Management and supervisors will become more effective with the use of sound budgetary procedures. The formulation of the budget must commence with the lowest echelon of management submitting its estimates based on standards to accomplish the goals and plans which management has set forth in the guidelines. Each echelon up the management chain of command in turn reviews the estimates of the next level beneath, and submits its own estimate to the next higher level. The process of the echelon development of the budget is the most effective way of establishing a sound budget program for it assures the proper inclusion of and attention to the myriad of details which could not possibly be considered by higher echelons because of the sheer volume of work entailed. Most important of all are the intangible

benefits gained by the lower echelons when they participate in the formulation of the budget, namely the sense of belonging to the management team and the sense of responsibility for achieving the objectives. The supervisor who participates in drafting the budget for his shop or department is far more sensitive to his responsibility for adhering to the plan than the one who is merely handed a piece of paper and told that is his budget or standard for the quarter.

CHAPTER V

CONCLUSION

The Bureau of Aeronautics has made considerable progress in developing the over-all cost accounting structure and related operating procedures as a basis for controlling the Overhaul and Repair Departments. Analyzing costs in relation to predetermined standards and comparing costs of comparable functions in similar activities has helped in developing cost responsibility at all operating levels. The placing of cost responsibility at the operating level, as well as the management level, has resulted in increased cost consciousness throughout the departments.

To accomplish maximum control it is believed that the Bureau of Aeronautics should install the Navy Industrial Fund system at all of its Overhaul and Repair Departments, especially since the shipyards which have installed this system have found it so satisfactory. By use of working fund financing and commercial type accounting, shipyards have made considerable progress in highlighting costs by function, as well as by direct labor, direct material, shop expense, and general and administrative expense. With the Navy Industrial Fund, established local management within the shipyards has been provided with effective tools to give it means of operating on a more efficient basis than was previously possible. Utilizing experience gained by the shipyards in their industrial fund projects, it is conceived that the system could be installed quite readily in the Overhaul and Repair Departments.

CHAPTER V

CONCLUSION

Keeping in mind that each installation requires a custom-built system to provide accurate costs, inventory accounting, financial and budgetary controls and reporting, the project would of a necessity be a long term one. A model department should first be set up so that top level personnel could gain experience, and manuals of instruction and procedure could be prepared to cover the industrial fund concept when the system is ready to be installed in the various departments.

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